JOURNAL OF THEORETICAL BIOLOGY

Co-Chief Editors: Stuart Kauffman
Lewis Wolpert

Editorial Board:
Nick Barton
Clas Blomberg
James Bonner
Athel Cornish-Bowden
Antonio Coutinho
Jack Cowan
John Dani
Freeman Dyson
I. M. Gelfand
Michael Gilpin
Leon Glass
Albert Goldbeter
Brian Goodwin
Michael Hassall
Tom B. L. Kirkwood
Michael Lacker
Julian H. Lewis
William R. Lieb
Ronald B. Luftig
Robert M. May
John Maynard Smith
James D. Murray
Tomoko Ohta
Howard H. Pattee
Alan S. Perelson
Stuart L. Pimm
Michael R. Rose
Michael Savageau
Peter Schuster
Toshisumi Takenaka
John Tyson
John Z. Young

VOLUME 170
September–October

QH
301
J75

ACADEMIC PRESS
London San Diego New York Boston
Sydney Tokyo Toronto

Copyright © 1994, by Academic Press Limited

ALL RIGHTS RESERVED

No part of this volume may be reproduced in any
form, by photostat, microfilm, or any other means,
without written permission from the publishers.

Printed in Great Britain

Contents for Volume 170

Number 1, 7 *September* 1994

LARSON, K. B., PERMAN, W. H., PERLMUTTER, J. S., GADO, M. H., OLLINGER, J. M. and ZIERLER, K., Tracer-Kinetic Analysis for Measuring Regional Cerebral Blood Flow by Dynamic Nuclear Magnetic Resonance Imaging 1

LATTA, R. and RITLAND, K., Conditions Favoring Stable Mixed Mating Systems with Jointly Evolving Inbreeding Depression 15

FISHMAN, M. A.. and PERELSON, A. S., Th1/Th2 Cross Regulation . . . 25

WEDEKIND, C., Handicaps not Obligatory in Sexual Selection for Resistance Genes 57

MCLEAN, A. R., Modelling T Cell Memory 63

KOOI, B. W. and KOOIJMAN, S. A. L. M., Existence and Stability of Microbial Prey–Predator Systems 75

KOOI, B. W. and KOOIJMAN, S. A. L. M., The Transient Behaviour of Food Chains in Chemostats 87

MAY, R. M. and NOWAK, M. A., Superinfection, Metapopulation Dynamics, and the Evolution of Diversity 95

Number 2, 21 *September* 1994

BURNS, P. T., On the Fittedness of Organisms and the Ascendency of Ecosystems: Toward a Hierarchical Model of Network Development . 115

DOBEK, A., PAILLOTIN, G., GAPIŃSKI J., BRETON, J., LEIBL, W. and TRISSL, H.-W., Amplitude and Polarity of the Light Gradient Photovoltage from Chloroplasts 129

TOKUDA, H. and SENO, H., Some Mathematical Considerations on the Parent–Offspring Conflict Phenomenon 145

MARKS, A., DEUTSCH, J. C. and CLUTTON-BROCK, T. H., Stochastic Influences, Female Copying and the Intensity of Sexual Selection on Leks . . 159

LEIBOWITZ, A. H., Selection for Hybrid Inviability through Kin Selection . 163

KELLER, A. D., Specifying Epigenetic States with Auroregulatory Transcription Factors 175

VINET, A. and ROBERGE, F. A., Excitability and Repolarization in an Ionic Model of the Cardiac Cell Membrane 183

VINET, A. and ROBERGE, F. A., Analysis of an Iterative Difference Equation Model of the Cardiac Cell Membrane 201

5 153HI XL 1465
2/95 31249-200

LUNDBERG, S. and SMITH, H. G., Parent–Offspring Conflicts over Reproductive Efforts: Variations upom a Theme by Charnoz 215

LIECHTI, F., HEDENSTRÖM, A. and ALERSTRAM T., Effects of Sidewinds on Optimal Flight Speed of Birds 219

LETTER TO THE EDITOR

LI, T., A Possible Role of Molecular Decay in the Origin of Asymmetric Emergence of Biomolecules on Earth 227

Number 3, 7 *October* 1994

KŘEMEN, A., Ribosomes as Molecular Energy Machines 231

KEMP, G. J., Interactions of Mitochondrial ATP Synthesis and the Creatine Kinase Equilibrium in Skeletal Muscle 239

MEHR, R., SEGEL, L., SHARP, A. and GLOBERSON, A., Colonization of the Thymus by T Cell Progenitors: Models for Cell–Cell Interactions 247

ENSMINGER, P. A. and VINSON, M., Deterministic Non-linear Dynamics in *Phycomyces* Sporangiophores 259

GOTO, K., The On–Off Mechanisms of the Nicotinic Acetylcholine Receptor Ion Channel are Performed by Thermodynamic Forces 267

FOWLER, A. C., KEMBER, G., JOHNSON, P., WALTER, S. J., FLEMING, P. and CLEMENTS, M., A Method for Filtering Respiratory Oscillations . . 273

MARKS, R., PERCY, J. S., SEMPLE, J. and KUMAR, S., Quadriceps Femoris Activation Changes in Genu varum: A Possible Biomechanical Factor in the Pathogenesis of Osteoarthrosis 283

PROMISLOW, D. E. L., DNA Repair and the Evolution of Longevity: A Critical Analysis 291

JABLONKA, E., Inheritance Systems and the Evolution of New Levels of Individuality 301

GUILFORD T., "Go-slow" Signalling and the Problem of Automimicry . . 311

LE GUYADER, H. and HYVER, C., A Single Model can Account for the Main Asymmetries of the Cortex of *Paramecium*: Application to Homopolar Doublets 317

LETTER TO THE EDITOR

VERKHOVOD, A. B., Alphanumerical Divisions of the Universal Genetic Code: New Divisions Reveal New Balances 327

Number 4, 21 *October* 1994

RIGGS, J. E., Carcinogenesis, Genetic Instability and Genomic Entropy: Insight Derived from Malignant Brain Tumor Age Specific Mortality Rate Dynamics 331

ZHANG, S., GOLDMAN, E. and ZUBAY, G., Clustering of Low Usage Codons and Ribosome Movement 339

DEMIDOV, A. A., Determination of Fluorescence Polarization of Double Chromophore Complexes 355

BÉLAND, P. and ALLEN, T. F. H., The Origin and Evolution of the Genetic Code 359

ESSUNGER, P. and PERELSON, A. S., Modeling HIV Infection of CD4$^+$ T-cell Subpopulations 367

FRANK, S. A., Genetics of Mutualism: The Evolution of Altruism between Species 393

DETOURS, V., BERSINI, H., STEWART, J. and VARELA, F., Development of an Idiotypic Network in Shape Space 401

SAYERS, J. R., Computer Aided Identification of a Potential 5′–3′ Exonulease Gene Encoded by *Escherichia coli* 415

LETTERS TO THE EDITOR

SACHS, T., Variable Development as a Basis for Robust Pattern Formation 423

TUOMI, J., AUGNER, M. and NILSSON, P., A Dilemma of Plant Defences: Is it Really Worth Killing the Herbivore? 427

Index to Volume 170

ALERSTRAM, T. (see LIECHTI, F.), 219
ALLEN, T. F. H. (see BÉLAND, P.), 359
Alphanumerical divisions of the universal genetic code (letter), 327
Altruism between species, evolution of, 393
ATP synthesis, mitochondrial, and the creatine kinase equilibrium in skeletal muscle, 239
AUGNER, M. (see TUOMI, J.), 427
Automimicry, "go-slow" signalling and the problem of, 311

BÉLAND, P. and ALLEN, T. F. H., The origin and evolution of the genetic code, 359
BERSINI, H. (see DETOURS, V.), 401
Biomolecules, molecular decay in origin of emergence of (letter), 227
Birds: effects of sidewinds on optimal flight speed, 219
Blood flow, cerebral, measurement by NMR imaging; tracer-kinetic analysis, 1
Brain tumor, malignant; age specific mortality rate dynamics, 331
BRETON, J. (see DOBEK, A.), 129
BURNS, P. T., On the fittedness of organisms and the ascendency of ecosystems: toward a hierarchical model of network development, 115

Carcinogenesis, genetic instability and genomic entropy, 331
Cardiac cell membrane, ionic model of, 183
Cardiac cell membrane, an iterative difference equation model of, 201
Cell–cell interaction models; colonization of the thymus by T cell progenitors, 247
Cell membrane, cardiac, an iterative difference equation model of, 201
Cell membrane, cardiac, an ionic model of, 183
Cerebral blood flow measurement by NMR imaging; tracer-kinetic analysis, 1
Chemostats, transient behaviour of food chains in, 87
Chloroplasts, amplitude and polarity of the light gradient photovoltage from, 129
Chromophore complexes, determination of fluorescence polarization of, 355
CLEMENTS, M. (see FOWLER, A. C.), 273
Clustering of low usage codons and ribosome movement, 339
CLUTTON-BROCK, T. H. (see MARKS, A.), 159
Codons, low usage, and ribosome movement, 339
Computer aided identification of a potential 5′-3′ exonuclease gene encoded by *Escherichia coli*, 415
Cortex of *Paramecium*, a single model can account for the main asymmetries of, 317
Creatine kinase equilibrium in skeletal muscle, interactions of mitochondrial ATP synthesis and, 239

Defences, plant, a dilemma; is it really worth killing the herbivore? (letter), 427
DEMIDOV, A. A., Determination of fluorescence polarization of double chromophore complexes, 355
Deterministic non-linear dynamics in *Phycomyces* sporangiophores, 259
DETOURS, V., BERSINI, H., STEWART, J. and VARELA, F., Development of an idiotypic network in shape space, 401
DEUTSCH, J. C. (see MARKS, A.), 159
Development, variable, as a basis for robust pattern formation (letter), 423
Diversity, evolution of, 95
DNA repair and the evolution of longevity, 291
DOBEK, A., PAILLOTIN, G., GAPIŃSKI, J., BRETON, J., LEIBL, W. andTRISSL, H.-W., Amplitude and polarity of the light gradient photovoltage from chloroplasts, 129

Ecosystems, on the fittedness of organisms and the ascendency of, 115
ENSMINGER, P. A. and VINSON, M., Deterministic non-linear dynamics in *Phycomyces* sporangiophores, 259
Entropy, genomic; carcinogenesis and genetic instability, 331
Epigenetic states and autoregulatory transcription factors, 175
Escherichia coli, computer aided identification of a potential 5′-3′ exonuclease gene encoded by, 415
ESSUNGER, P. and PERELSON, A. S., Modeling HIV infection of $CD4^+$ T-cell subpopulations, 367
Evolution of altruism between species, 393
Evolution of diversity, 95
Evolution of the genetic code, 359
Evolution of longevity; DNA repair, 291
Evolution of new levels of individuality; inheritance systems, 301

Female copying and the intensity of sexual selection on leks, 159
Filtering respiratory oscillations, a method for, 273
FISHMAN, M. A. and PERELSON, A. S., Th1/Th2 cross regulation, 25
FLEMING, P. (see FOWLER, A. C.), 273
Flight speed, optimal, of birds; effects of sidewinds, 219
Fluorescence polarization of double chromophore complexes, determination of, 355
Food chains in chemostats, transient behaviour of, 87
FOWLER, A. C., KEMBER, G., JOHNSON, P., WALTER, S. J., FLEMING, P. and CLEMENTS, M., A method for filtering respiratory oscillations, 273
FRANK, S. A., Genetics of mutualism: the evolution of altruism between species, 393

GADO, M. H. (see LARSON, K. B.), 1
GAPIŃSKI, J. (see DOBEK, A.), 129
Gene, 5′-3′ exonuclease, encoded by *Escherichia coli*, computer aided identification of, 415
Genes, resistance, handicaps not obligatory in sexual selection for, 57
Genetic code, origin and evolution of, 359
Genetic code, universal, alphanumerical divisions of (letter), 327
Genetic instability, genomic entropy and carcinogenesis, 331
Genetics of mutualism: evolution of altruism between species, 393
Genu varum, quadriceps femoris activation changes in; pathogenesis of osteoarthrosis, 283
GLOBERSON, A. (see MEHR, R.), 247
GOLDMAN, E. (see ZHANG, S.), 339
"Go-slow" signalling and the problem of automimicry, 311
GOTO, K., The on–off mechanisms of the nicotinic acetylcholine receptor ion channel are performed by thermodynamic forces, 267
GUILFORD, T., "Go-slow" signalling and the problem of automimicry, 311

Handicaps not obligatory in sexual selection for resistance genes, 57
HEDENSTRÖM, A. (see LIECHTI, F.), 219
Herbivore, killing of, and plant defences (letter), 427
HIV infection of $CD4^+$ T-cell subpopulations; modeling, 367
Hybrid inviability, selection for, through kin selection, 163

Inbreeding depression, jointly evolving; conditions favoring stable mixed mating systems, 15
Individuality, inheritance systems and the evolution of new levels of, 301
Inheritance systems and the evolution of new levels of individuality, 301
Ion channel, nicotinic acetylcholine receptor; on–off mechanisms are performed by thermodynamic forces, 267
Ionic model of the cardiac cell membrane, excitability and repolarization in, 183

JABLONKA, E., Inheritance systems and the evolution of new levels of individuality, 301
JOHNSON, P. (see FOWLER, A. C.), 273

KELLER, A. D., Specifying epigenetic states with autoregulatory transcription factors, 175
KEMBER, G. (see FOWLER, A. C.), 273
KEMP, G. J., Interactions of mitochondrial ATP synthesis and the creatine kinase equilibrium in skeletal muscle, 239
Kin selection, selection for hybrid inviability through, 163
KOOI, B. W. and KOOIJMAN, S. A. L. M., Existence and stability of microbial prey–predator systems, 75
KOOI, B. W. and KOOIJMAN, S. A. L. M., The transient behaviour of food chains in chemostats, 87
KOOIJMAN, S. A. L. M. (see KOOI, B. W.), 75, 87
KŘEMEN, A., Ribosomes as molecular energy machines, 231
KUMAR, S. (see MARKS, R.), 283

LARSON, K. B., PERMAN, W. H., PERLMUTTER, J. S., GADO, M. H., OLLINGER, J. M. and ZIERLER, K., Tracer-kinetic analysis for measuring regional cerebral blood flow by dynamic nuclear magnetic resonance imaging, 1
LATTA, R. and RITLAND, K., Conditions favoring stable mixed mating systems with jointly evolving inbreeding depression, 15
LE GUYADER, H. and HYVER, C., A single model can account for the main asymmetries of the cortex of *Paramecium:* application to homopolar doublets, 317
LEIBL, W. (see DOBEK, A.), 129
LEIBOWITZ, A. H., Selection for hybrid inviability through kin selection, 163
Leks, stochastic influences, female copying and the intensity of sexual selection on, 159
LI, T., A possible role of molecular decay in the origin of asymmetric emergence of biomolecules on earth (letter), 227

LIECHTI, F., HEDENSTRÖM, A. and ALERSTRAM, T., Effects of sidewinds on optimal flight speed of birds, 219
Light gradient photovoltage from chloroplasts, amplitude and polarity of, 129
Longevity, DNA repair and the evolution of, 291
LUNDBERG, S. and SMITH, H. G., Parent–offspring conflicts over reproductive efforts: variations upon a theme by Charnoz, 215

Machines, molecular energy, ribosomes as, 231
MCLEAN, A. R., Modelling T cell memory, 63
Malignant brain tumor age specific mortality rate dynamics, 331
MARKS, A., DEUTSCH, J. C. and CLUTTON-BROCK, T. H., Stochastic influences, female copying and the intensity of sexual selection on leks, 159
MARKS, R., PERCY, J. S., SEMPLE, J. and KUMAR, S., Quadriceps femoris activation changes in genu varum: a possible biochemical factor in the pathogenesis of osteoarthrosis, 283
Mating systems, mixed, stable, with jointly evolving inbreeding depression, 15
MAY, R. M. and NOWAK, M. A., Superinfection, metapopulation dynamics, and the evolution of diversity, 95
MEHR, R., SEGEL, L., SHARP, A. and GLOBERSON, A., Colonization of the thymus by T cell progenitors: models for cell–cell interactions, 247
Memory, T cell; modelling, 63
Metapopulation dynamics and the evolution of diversity, 95
Microbial prey–predator systems, existence and stability of, 75
Mitochondrial ATP synthesis and the creatine kinase equilibrium in skeletal muscle, 239
Molecular decay in the origin of asymmetric emergence of biomolecules on earth (letter), 227
Molecular energy machines, ribosomes as, 231
Muscle, skeletal, interactions of mitochondrial ATP synthesis and the creatine kinase equilibrium in, 239
Mutualism genetics: the evolution of altruism between species, 393

Network development, toward a hierarchical model of, 115
Network, idiotypic, in shape space, development of, 401
Nicotinic acetylcholine receptor ion channel; on–off mechanisms are performed by thermodynamic forces, 26
NILSSON, P. (see TUOMI, J.), 427
NOWAK, M. A. (see MAY, R. M.), 95
Nuclear magnetic resonance imaging, tracer-kinetic analysis for measuring cerebral blood flow by, 1

OLLINGER, J. M. (see LARSON, K. B.), 1
On–off mechanisms of the nicotonic acetylcholine receptor ion channel are performed by thermodynamic forces, 267
Organisms, fittedness of, and the ascendency of ecosystems, 115
Osteoarthrosis, biomechanical factor in pathogenesis of, 283

PAILLOTIN, G. (see DOBEK, A.), 129
Paramecium cortex, a single model can account for the main asymmetries of, 317
Parent–offspring conflicts over reproductive efforts; variations on a theme by Chernoz, 215
Parent–offspring conflict phenomenon; mathematical considerations, 145
Pattern formation, robust, variable development as a basis for (letter), 423
PERCY, J. S. (see MARKS, R.), 283
PERELSON, A. S. (see ESSUNGER, P.), 367
PERLMUTTER, J. S. (see LARSON, K. B.), 1
PERMAN, W. H. (see LARSON, K. B.) 1
Photovoltage from chloroplasts; amplitude and polarity, 129
Phycomyces sporangiophores, deterministic non-linear dynamics in, 259
Plant defences, a dilemma: is it really worth killing the herbivore? (letter), 427
Prey–predator, microbial, systems; existence and stability, 75
PROMISLOW, D. E. L., DNA repair and the evolution of longevity. A critical analysis, 291

Quadriceps femoris activation changes in genu varum: a possible biomechanical factor in the pathogenesis of osteoparthrosis, 283

Regulation, cross, Th1/Th2, 25
Reproductive efforts, parent–offspring conflicts over; variations on a theme by Charnoz, 215
Resistance genes, handicaps not obligatory in sexual selection for, 57
Respiratory oscillations; a method for filtering, 273

Ribosomes as molecular energy machines, 231
Ribosome movement, clustering of low usage codons and, 339
RIGGS, J. E., Carcinogenesis, genetic instability and genomic entropy: insight derived from malignant brain tumor age specific mortality rate dynamics, 331
RITLAND, K. (see LATTA, R.), 15
ROBERGE, F. A. (see VINET, A.), 183, 201

SACHS, T., Variable development as a basis for robust pattern formation (letter), 423
SAYERS, J. R., Computer aided identification of a potential 5′-3′ exonuclease gene encoded by *Escherichia coli*, 415
SEGEL, L. (see MEHR, R.), 247
Selection for hybrid inviability through kin selection, 163
Selection, sexual, on leks, 159
Selection, sexual, for resistance genes, handicaps not obligatory in, 57
SEMPLE, J. (see MARKS, R.), 283
SENO, H. (see TOKUDA, H.), 145
Sexual selection on leks, 159
Sexual selection for resistance genes, handicaps not obligatory in, 57
Shape space, development of an idiotypic network in, 401
SHARP, A. (see MEHR, R.), 247
Sidewinds: effects on optimal flight speed of birds, 219
Signalling, "go-slow", and the problem of automimicry, 311
SMITH, H. G. (see LUNDBERG, S.), 215
Species, the evolution of altruism between, 393
Sporangiophores, *Phycomyces*, deterministic non-linear dynamics in, 259
Stability of microbial prey–predator systems, 75
STEWART, J. (see DETOURS, V.), 401
Superinfection, metapopulation dynamics, and the evolution of diversity, 95

T-cell, $CD4^+$, subpopulations, modeling HIV infection of, 367
T cell memory model, 63
T cell progenitors, colonization of the thymus by, 247
Th1/Th2 cross regulation, 25
Thermodynamic forces, the on–off mechanisms of the nicotinic acetylcholine receptor ion channel are performed by, 267
Thymus colonization by T cell progenitors; models for cell-cell interactions, 247
TOKUDA, H. and SENO, H., Some mathematical considerations on the parent–offspring conflict phenomenon, 145
Tracer-kinetic analysis for measuring regional cerebral blood flow by dynamic NMR imaging, 1
Transcription factors, autoregulatory, specifying epigenetic states with, 175
TRISSL, H.-W. (see DOBEK, A.), 129
TUOMI, J., AUGNER, M. and NILSSON, P., A dilemma of plant defences: is it really worth killing the herbivore? (letter), 427

VARELA, F. (see DETOURS, V.), 401
VERKHOVOD, A. B., Alphanumerical divisions of the universal genetic code: new divisions reveal new balances (letter), 327
VINET, A. and ROBERGE, F. A., Analysis of an iterative difference equation model of the cardiac cell membrane, 201
VINET, A. and ROBERGE, F. A., Excitability and repolarization in an ionic model of the cardiac cell membrane, 183
VINSON, M. (see ENSMINGER, P. A.), 259

WEDEKIND, C., Handicaps not obligatory in sexual selection for resistance genes, 57
WALTER, S. J. (see FOWLER, A. C.), 273

ZHANG, S., GOLDMAN, E. and ZUBAY, G., Clustering of low usage codons and ribosome movement, 339
ZIERLER, K. (see LARSON, K. B.), 1
ZUBAY, G. (see ZHANG, S.), 339

Digitized by the Internet Archive
in 2026

https://archive.org/details/journal-of-theoretical-biology_september-october-1994_170_index-contents